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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/606,097

06/25/2003

Yutaka Higo

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06/24/2004

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EXAMINER

HUYNH, ANDY


ART UNIT

PAPER NUMBER

2818

DATE MAILED: 06/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Applicati n No.</b> 10/606,097	<b>Applicant(s)</b> HIGO ET AL.	
	<b>Examiner</b> Andy Huynh	<b>Art Unit</b> 2818	

-- The MAILING DATE of this communication appears on the cov r sh t with th correspondenc address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2003.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-6 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 25 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

Claims 1-6 are pending in the application is acknowledged.

### *Priority*

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d) based on an application filed in JAPAN P2002-186791 on 06/26/2002.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (USP: 6,090,480).

Regarding claim 1, Hayashi discloses in Fig. 11 and related texts as set forth in column 7, lines 44-48 and lines 60-66, in a magnetoresistive effect element in which a pair of ferromagnetic material layers (102, 106) is opposed to each other through an intermediate layer/an non-magnetic layer (104) to obtain a magnetoresistive change by causing a current flow in the direction perpendicular to the layer surface (col. 3, lines 61-64), a magnetoresistive effect element characterized in that one of said ferromagnetic material layers is a magnetization fixed layer/a fixed magnetic layer (106) and the other ferromagnetic material layer is a magnetization

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free layer/a first free magnetic layer (102), said magnetization free layer is made of a ferromagnetic material containing FeCoB (col. 7, lines 60-61).

Hayashi fails to teach that the magnetization free layer has a film thickness ranging from 2 nm to 8 nm. However, Hayashi does teach that the first free magnetic layer (102) has a film thickness ranging from 1 to 10 nm, preferably 0.1 to 5 nm (col. 7, lines 65-66).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the magnetization free layer having a film thickness ranging from 2 nm to 8 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 3, Hayashi discloses in Fig. 11 that the magnetoresistive effect element has a laminated ferri structure.

Claims 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (USP: 6,090,480) in view of Arai et al. (USP: 6,671,136 hereinafter referred to as "Arai").

Hayashi discloses the claimed limitations except for a magnetoresistive effect element according to claim 1, wherein said magnetoresistive effect element is a tunnel magnetoresistive effect element using a tunnel barrier layer made of an insulating or semiconductor material as said intermediate layer. Arai teaches that it is known to the art a magnetoresistive effect film (TMR) that uses a tunnel magnetoresistive effect film having two ferromagnetic layers and a tunnel barrier layers interposed between the two ferromagnetic layers is expected to be promising for realizing high density recording, and a TMR comprising two Fe films an Al oxide

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film interposed between two Fe films was reported to have a high magnetoresistive change rate of approximately 18% at a room temperature as set forth in column 1, lines 38-48. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize a magnetoresistive effect film (TMR) that uses a tunnel magnetoresistive effect film having two ferromagnetic layers and a tunnel barrier layers interposed between the two ferromagnetic layers, and a TMR comprising two Fe films an Al oxide film interposed between two Fe films, as taught by Arai in order for realizing high density recording.

Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishi et al. (USP: 6,730,949 hereinafter referred to as "Kishi") in view of Hayashi (USP: 6,090,480).

Regarding claims 4 and 5, Kishi discloses in Figs. 13A-13C and 20, in a magnetic memory device comprising a magnetoresistive effect element (TMR) (Fig. 20, col. 22, lines 62-64) designed in such a manner that a ferromagnetic tunnel junction sandwiching a tunnel barrier layer (307) made of Al<sub>2</sub>O (col. 17, line 42) is formed between a pair of ferromagnetic material layers (301 and 306) to cause a current to flow in the direction perpendicular the layer surface (col. 7, lines 54-56) and word lines (807) and bit lines (806) sandwiching said magnetoresistive effect element in the thickness direction, a magnetic memory device characterized in that one of said ferromagnetic material layers is magnetization fixed layer (306) (col. 17, line 42) and the other ferromagnetic material layer is a magnetization free layer (301) (col. 17, lines 52-54).

Kishi fails to teach the magnetization free layer is made of a ferromagnetic material containing Fecob or FeCONiB and the magnetization free layer having a film thickness ranging from 2 nm to 8 nm.

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Hayashi teaches that the first free magnetic layer (102), made of a ferromagnetic material containing FeCoB (col. 7, lines 60-61), has a film thickness ranging from 1 to 10 nm, preferably 0.1 to 5 nm (col. 7, lines 65-66).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the first free magnetic layer made of a ferromagnetic material containing FeCoB, as taught by Hayashi since FeCoB is one of powerful candidates of the material constituting a spin valve for the free magnetic layers (col. 4, lines 35-38).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the magnetization free layer having a film thickness ranging from 2 nm to 8 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 6, Hayashi discloses in Fig. 11 that the magnetoresistive effect element has a laminated ferri structure.

### ***Conclusion***

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy Huynh, (571) 272-1781. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The Fax number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the -status of this application or proceeding should be directed to the receptionist whose phone number is (703) 308-0956.

AH

June 19, 2004

A handwritten signature in black ink, appearing to read "Andy Huynh", with a stylized flourish at the end.

Andy Huynh

Patent Examiner